

WHAT IS CLAIMED IS:

- 5 1. A non-linear resistive device comprising a first electrode and a second electrode connected through an electrical pathway that includes a particle matrix, containing coated conductive particles having a conductive core and a nonconductive coating formed in an atomic layer deposition process covering the entire surface of the core, wherein said coating has a thickness of about 0.5 to about 100 nm, and said
10 particle matrix exhibits non-linear resistance.
2. The device of claim 1 wherein the particle matrix includes a polymeric binder.
3. A non-linear resistive device according to claim 2 wherein the particles are
15 loaded into the polymeric binder at or above the percolation limit.
4. The device of claim 2 wherein core-to-core distances between adjacent particles are determined by the thicknesses of the coatings on the adjacent particles.
- 20 5. The device of claim 1 wherein the particle matrix further comprises semiconductor particles that are coated with a nonconductive coating formed in an atomic layer deposition process.
6. The device of claim 1 wherein the conductive core is copper, aluminum, nickel,
25 carbonyl nickel, molybdenum, silver, gold, zinc, cadmium, iron, tin, beryllium, lead; an alloy of one or more of the foregoing metals, steel, bronze, brass, Mu-metal, titanium carbide, columbian carbide, tantalum carbide, tungsten carbide, zirconium carbide or a conductive metal silicide.
- 30 7. The device of claim 6, wherein the nonconductive coating is Al_2O_3 , SiO_2 , Hf_2O_3 , ZrO_2 , or TaO_2 .
8. The device of claim 7, wherein the coating thickness is from about 0.5 to about

100 nm.

9. The device of claim 8 wherein the core is iron, nickel or gold and the nonconductive coating is Al_2O_3 or SiO_2 .

5

10. A method for protecting an electronic circuit from a transient electrical voltage, comprising electrically connecting one electrode of the device of claim 1 to a power source for the electronic circuit, and the other electrode of the device of claim 1 to ground.

10